

Idaho National Laboratory

The Human Systems Simulation Laboratory at Idaho National Laboratory

The Human Systems Simulation Laboratory (HSSL) was created at Idaho National Laboratory (INL) in 2012 as a full-scope, full-scale control room simulator facility to support research on nuclear power plant control room modernization (Boring et al., 2013). The facility consists of an observation gallery and control room. The control panels consist of 15 touchscreen bays, each with three to four displays, which allow representation of the full front panels of current U.S. main control rooms at nuclear power plants. These control rooms are currently largely analog, and the glasstop simulator presents such analog instrumentation and controls as functional, dynamic mimics on the displays. Because of the virtual nature of the simulator, it is also possible to introduce representations of new digital human-machine interfaces (HMIs) that will replace the existing boards. Researchers at INL develop prototypes of new HMIs and benchmark performance of reactor crews using the existing vs. new boards. These operator-in-the-loop design studies have also yielded considerable process insights, resulting in new human factors techniques like the Guideline for Operational Nuclear Usability and Knowledge Elicitation (GONUKE; Boring et al., 2015), which outlines methods and measures for verification and validation of control system upgrades.